IBL LABORATORY CONNECTIONS

IDAHO DEPARTMENT OF HEALTH & WELFARE

Volume I 2006

PERSPECTIVE

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This issue of Laboratory Connections focuses on the expansion of testing capabilities at IBL, which will provide additional technical backup to the LRN laboratories, both routinely and in the case of an emergency.

- Pertussis proves the adage “Every thing old is new again.”
- The article regarding Shiga toxin producing *E. coli,* on page 2, is based on a poster presented at the One Hundred and Fifth General Meeting of ASM by Vivian Lockary. After reading this article, we hope you will be inspired to become involved in the ongoing study. This is a great opportunity for Idaho to be at the forefront of some significant research.
- What the 16SrRNA gene sequencing of Mycobacterium means to you. See page 3.
- The capacity of the IBL to test for agents of chemical terrorism continues to expand. See the article on page 3. Contact Ian Elder, Ph.D. at elderi@idhw.state.id.us if you have additional questions.
- Colleen Greenwalt, microbiology section manger, will provide updates via e-mail of the latest information regarding the flu. Contact Colleen at greenwac@idhw.state.id.us if you would like to be added to her distribution list.

Reminder

Worldwide approximately 48.5 million cases of pertussis occur each year. More than 200 cases were reported in Idaho in 2005.

Pertussis circulates in populations with high vaccination rates of infants and children.

Protection from vaccination lasts for 6-10 years while protection from natural infections wanes after 10-15 years.

Transmission of disease in highly vaccinated populations occurs mainly from adolescents and adults to infants or among older vaccinated populations.

In outbreak situations, asymptomatic carriage has been observed in up to 50%.

Culture varies in sensitivity, being highest for young unvaccinated infants with short duration of symptoms and lowest (<10%) for adolescents and adults with a longer duration of coughing.

More information regarding pertussis testing can be found at **Riffelmann, M., C.H. Wirsing von Konig, V. Caro and N. Guiso**. 2005. Nucleic Acid Amplification Tests for Diagnosis of Bordetella Infections. J. Clin. Microbiol.**43**: 4925-4929

Surveillance of Enterohemorrhagic *E. coli* 2002-2004

In response to Shiga toxin (Stx) testing and detection by Eastern Idaho Regional Medical Center, Idaho Falls, Idaho (EIRMC) and the CDC recommendation that all stools from persons with diarrhea or HUS be tested for Stx, the Idaho Bureau of Laboratories (IBL) began offering Stx screening in April 2002 to study the prevalence of Shiga toxin *E. coli* (STEC) in Idaho.

Prior to the fall of 2005, EIRMC was the only Idaho laboratory to include routine Stx screening by EIA in their stool protocol. In our study we compared EIRMC STEC incidence results with those from statewide laboratories participating in our STEC surveillance program. EIRMC stool samples represented 98% of STEC screens performed in District 7.

Conclusion:

Other surveys have consistently shown a greater incidence of O157:H7 in areas of the country with higher screening rates. Our study uncovered a significantly higher incidence of non-O157 STEC in one Idaho population with a higher screening rate.

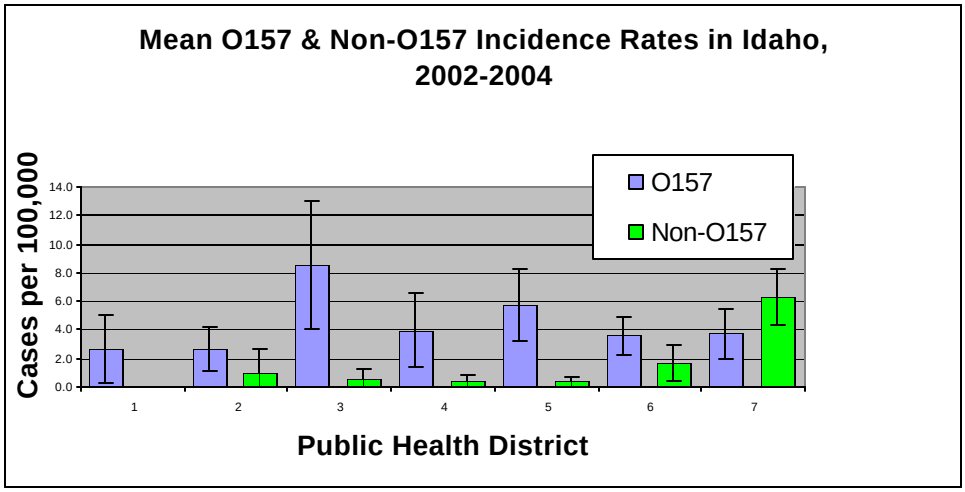
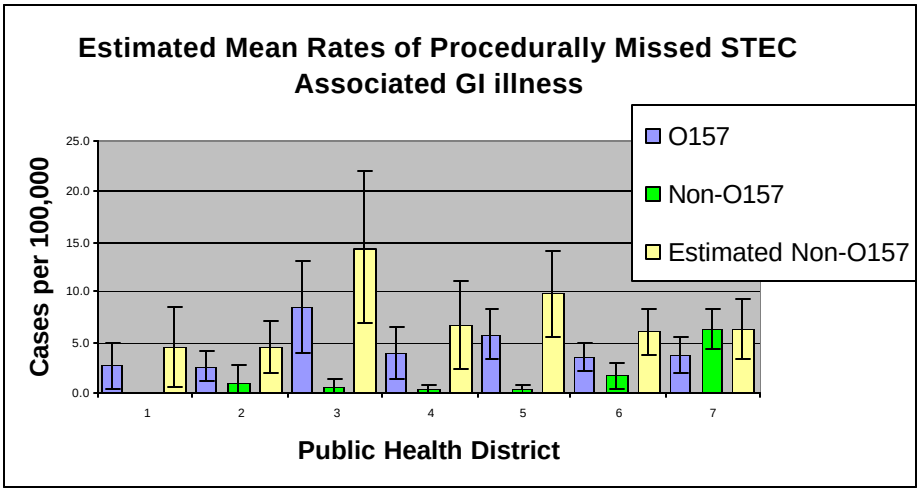


Figure 1: The mean reported *E. coli* O157:H7 rates for each of the seven public health districts show no significant difference.

Figure 2: The mean of non-O157 STEC reported from District 7 was greater than the rest of the state combined and the ratio of *E. coli* O157:H7 to non-O157 STEC incidence was strikingly different between District 7 and all of the other districts.



Discussion

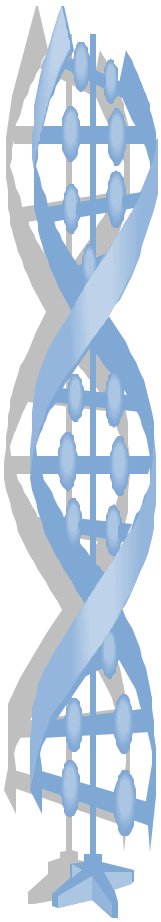
Although O157 STEC is thought to cause at least 80% of cases of HUS in North American (Bopp, et al, "Escherichia, Shigella, and Salmonella", Manual of Clinical Microbiology. 8th ed., 654-671), our study indicated this may not be the case in Idaho. Our findings show the incidence of non-O157 STEC in Idaho may be underreported and misdiagnosed in as many as two-thirds of cases. Contact Vivian Lockary at lockaryv@idhw.state.id.us if you are interested in participating in this study.

16S rRNA Gene Sequencing — Mycobacterium ID

Over the last two decades, the identification of bacterial isolates has become increasingly reliant upon molecular biology methods, especially the comparative analysis of small subunit ribosomal RNA (16S rRNA) gene sequences. The 16S rRNA gene encodes for the approximately 1,550 nucleotide 16S rRNA molecule which combines with 20 ribosomal proteins to form the bacterial 30S ribosomal small subunit. Due to the important nature of ribosomes in the cell and the necessity for ribosomal active sites to maintain stable functional conformations, many, but not all, of the regions in the 16S rRNA sequence are the same among bacteria. By comparatively analyzing the variable regions in the 16S rRNA molecule (or its DNA gene sequence) among different species, taxonomists have been able to develop a phylogenetic framework for the identification of bacteria. Prior to the use of comparative sequence analysis, the development of a phylogenetic context for bacteria was not possible since traditional phenotypic and numerical taxonomic approaches can not accurately depict evolutionary relationships among bacterial species.

The development of this phylogenetic approach for bacterial taxonomy has resulted in the reclassification of many traditionally identified bacterial groups. Additionally, several new species designations have been made within most genera. This is especially apparent in Mycobacteriology, where there are now more than 120 validly described *Mycobacterium* species or subspecies (see http://www.dsmz.de/bactnom/bactname.htm for list). As with other taxa, much of differentiation among *Mycobacterium* species relies upon the use of comparative 16S rRNA gene sequence analysis. As a result of the increasing reliance upon this molecular method, the ability of microbiologists to correctly identify *Mycobacterium* isolates using traditional approaches has been greatly impacted.

As a result of the increasing need to use molecular methods in bacterial identification, the IBL molecular lab is now routinely performing 16S rRNA gene sequencing as part of a polyphasic approach for the identification of selected *Mycobacterium* and other fastidious species that are difficult to identify using traditional methods. We offer this testing to our Idaho clinical laboratories and encourage submission of cultures for identification. Please feel free to contact IBL microbiology staff for further information about 16S rRNA gene sequencing or to inquire about sample submission.



Update: Testing Available for Agents of Chemical Terrorism

As a Level 2 laboratory in the Chemical Terrorism-Laboratory Response Network (LRN), IBL is responsible for implementing standardized analytical methods from the Centers for Disease Control and Prevention (CDC) for use during homeland security events. Implementing a CDC method at IBL requires approval of method validation results by CDC's Chemical-LRN Quality Assurance Coordinator and successful participation in proficiency tests. The four tests available at IBL are: Cyanide in Whole Blood; Mercury, Lead and Cadmium in Whole Blood; Arsenic and Selenium in Urine; and Toxic Elements in Urine (Beryllium, Cobalt, Molybdenum, Cadmium, Antimony, Cesium, Barium, Tungsten, Platinum, Thallium, Lead, and Uranium). Idaho's Sentinel Laboratories are encouraged to request any of these tests when patients have known exposure, or symptoms suggesting exposure to one of the chemicals listed above. Submission and testing of "real world" specimens is helpful in ensuring that public health emergency processes are functional. Specific guidelines on specimen collection, packaging and transport are required for chemical-LRN tests. If you have questions, please contact Ian Elder, Ph.D., Chemical Terrorism Laboratory Coordinator (208-334-2235 ext. 269).

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"PROTECTING THE ENVIRONMENT AND THE HEALTH OF THE PEOPLE OF IDAHO THROUGH TESTING AND RESEARCH."

LRN
LABORATORY RESPONSE NETWORK
PARTNERS IN PREPAREDNESS

Packaging and Shipping Web-Based Training Module (developed by the Oregon State Public Health Laboratory-Laboratory Response Network):
Will provide current Department of Transportation (DOT), CDC, U.S. Postal Service and international regulation on packaging and shipping of diagnostic specimens and infectious substances including online registrations and DOT Certification (required by DOT every 3 years).

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Questions? Contact: LRN.Office@state.or.us or phone 503-229-5882.
If you use a "pop-up blocker ", use the "control/enter" keys to bypass your browser "pop-up blocker" feature. You can see if your computer has a "pop-up" blocker by opening the following web site. http://www.popuptest.com/popuptest1.html
*You will need to use the bypass feature for **each chapter**, unless the "pop-up" blocker feature is disabled.*